FRD ACTIVITIES REPORT
October - December 2015

RESEARCH PROGRAMS

Project Sagebrush

The manuscript 'Revisiting the Values of the Horizontal Plume Spread Parameters σ_θ and σ_y' has been renamed 'Project Sagebrush: Revisiting the Value of the Horizontal Plume Spread Parameter σ_y' to better emphasize the focus of the material included. The key points are an introduction to Project Sagebrush and that the magnitudes of σ_y, measured during Phase 1 of Project Sagebrush (PSB1), tended to be much larger than those determined from earlier field studies. Both older stability class models and newer models based on PBL theory rely in some way on results from older tracer field studies. The manuscript was returned from review at the Journal of Applied Meteorology and Climatology in late November. Revisions are in progress and will be submitted to the journal in January. A second paper 'An Investigation into the Magnitude and Variation in the Standard Deviation of Horizontal Wind Direction σ_θ' has passed internal ARL review. It is set for journal submission pending acceptance of the first manuscript.

Planning for phase 2 of the Project Sagebrush field study (PSB2) is in progress. Tentatively, this will emphasize low wind conditions during daytime (approx. late August, 2016) and nighttime (approx. late October, 2016).

Assistance is still being provided to Bruce Hicks in support of his work on nighttime turbulence in the stable boundary layer. (Dennis.Finn@noaa.gov, Rick Eckman and staff)

A manuscript entitled "How Should Sample Statistics be Defined for the Wind Direction?" was completed during the quarter and has completed the FRD internal review process. It discusses the large number of sample statistics that have been proposed for the wind direction and derives alternate formulas that are more consistent with the circular nature of the variable. The manuscript is a spin-off of the Project Sagebrush data analysis. After completing ARL review, the plan is to submit the manuscript to an AMS journal. (Richard.Eckman@noaa.gov)

Birch Creek Valley Wind Flow Study

The manuscript 'Evidence For Gap Flows and the Topographic Amplification Factor in the Birch Creek Valley, Idaho' has been prepared. It is based upon data generated by FRD, the U.S. Forest Service Fire Sciences Laboratory (FSL), and the Lab for Atmospheric Research (LAR) at Washington State University during a summer 2013 field deployment. It has been reviewed by all co-authors and revisions are in progress. Submission to ARL review is anticipated in the second quarter of FY2016. (Dennis.Finn@noaa.gov)

Wind Forecast Improvement Project (WFIP2)

The goal of this field experiment is to improve wind turbine hub height wind forecasts in areas of complex terrain. ARLFRD is focused on the improvement of forecast model boundary layer processes and estimates of surface fluxes of solar and longwave radiation, sensible heat, latent heat, and soil heat fluxes. Instrumentation including sonic anemometers, infrared gas analyzers, sodars, a radar wind profiler, and surface-flux stations were deployed in late September. Since the deployment, the incoming data have been monitored by Matt Brewer for quality and consistency with recent weather conditions.

Although most instruments have performed well, some issues have arisen. After multiple occasions in which the Boardman surface-flux system locked up, it was taken down and sent to LI-COR for repair. It was also discovered that the heater in the Prineville sodar was not operating, and this was fixed on Dec 23rd. Finally, our soil moisture/temperature instrumentation at Prineville ceased to function a few weeks ago, and the cause for this is unknown. All instrumentation was inspected and a few instruments were repaired by Shane Beard when he visited the site on Dec 22-23. (Matt.Brewer@noaa.gov, Shane Beard, and staff)

An important effort this last quarter has been setting up data transfers to the WFIP2 central data repository. Brad Reese and Bill Behymer have created scripts to automatically load data to the repository as it comes in, and much of the data are now available. Kirk Clawson and Matt Brewer are developing detailed metadata information for each system for the end users. (Brad.Reese@noaa.gov, Bill Behymer, Matt Brewer, Kirk Clawson)

ARL Convective Initiation Project

Mike Buban has largely completed a set of Large Eddy Simulations (LES) to investigate the effects of horizontal variations of surface fluxes on the initiation of convection. Such variations in fluxes due to changes in surface properties may be an important factor in triggering convection in the Southeastern U.S., where synoptic triggers such as fronts and drylines are less common during the summer months. Results from the Convective Initiation project will be presented during a session at the 2016 American Meteorological Society annual meeting in New Orleans. A presentation discussing the LES results entitled "The Simulated Effect of Surface Flux Heterogeneity on Convection Initiation in the Southeast U.S." will be included in that session. (Mike Buban (ATDD), Richard.Eckman@noaa.gov , Tilden Meyers, Bruce Baker)

Potential Tracer Project

In November, Jeff French (former FRD employee) and Bart Geerts at the University of Wyoming contacted FRD regarding the use of tracers for some of their cloud-seeding research. In a recent National Science Foundation proposal, they discuss plans to use one aircraft to seed clouds and a second trailing aircraft to observe the effects of the seeding. Currently, the trailing research aircraft has no way of determining when it is inside the seeding plume, so they want to investigate whether FRD's tracer technology can be adapted for this application. This would involve releasing gaseous tracer from the seeding aircraft and installing tracer samplers on the trailing aircraft. Mounting one of FRD's fast-response Trace Gas Analyzers in the research aircraft is the best option from a science perspective, but this approach has been ruled out for now due to the costs and logistics involved. A simpler alternative is to use bag samplers, which have limited temporal resolution but could be added to the aircraft payload with far less effort. The university expects to be notified of the proposal acceptance status in February 2016. (Richard.Eckman@noaa.gov, Kirk Clawson)

NOAA/IDAHO NATIONAL LABORATORY (INL) METEOROLOGICAL RESEARCH PARTNERSHIP

NOAA/INL Mesonet

A Campbell Scientific CR6 data logger was installed at the Roberts station of the NOAA/INL Mesonet in early October. It integrated smoothly into the existing radio communication network and has operated for the remainder of the quarter without any significant problems. We also began testing the new Esteem radio modems, but snow has blocked access to the mountain top radio repeater station thereby preventing any further testing. (Roger.Carter@noaa.gov, and Shane Beard)

We have experienced several episodes of radio frequency interference with the NOAA/INL Mesonet telemetry system at the FRD office. This effectively shuts down communications with the mesonet stations. Idaho Falls Power has assisted us in investigating the source of the problems and has made some repairs which corrected some of the problems. However, the interference we are currently experiencing has different characteristics and we have not been able to track it down. This has forced us to operate with a remote base station at the Grid 3 facility that is connected to the computers in the Idaho Falls office with a telephone line. This arrangement is subject to occasional telephone line problems making it less reliable than the local base station. (Roger.Carter@noaa.gov, and Shane Beard)

Earlier in 2015, FRD purchased a closed-path LI-COR 7200 gas analyzer to measure H_2O and CO_2 concentrations at a permanent flux station located at the INL Site. This instrument replaced an open-path LI-COR 7500 analyzer that had been operating at the site for many years. During the summer, however, both instruments were in operation simultaneously along with another LI-COR 7500 that was being field-tested as part of the WFIP2 project. Comparisons of the three instruments indicated that they were all providing similar measurements of the H_2O vapor concentration. But the CO_2 concentrations from the 7200 are missing the high-frequency fluctuations observed in the two open-path systems. The CO_2 spectra from the latter two systems exhibit the -5/3 slope expected at high frequencies, but the spectrum from the 7200 drops off rapidly to white noise at high frequencies. As a result, the 7200 was sent back to LI-COR for repairs. Their initial tests did not indicate any problems with the instrument. So far, neither LI-COR nor the FRD staff has come up with an explanation for the instrument's odd behavior during the summer tests. (Kirk.Clawson@noaa.gov, Rick Eckman)

Emergency Operations Center (EOC)

EOC Team D participated in a drill on Oct 6th involving a radiological release from a transportation accident. During the drill, EOC management made a request to activate the high-volume air samplers that are co-located with a number of FRD's meteorological towers. This exposed some coordination problems related to the samplers. The samplers are switched on and off by FRD staff but are actually owned and installed by an INL contractor. The contractor only installs the samplers during the warm season and had already removed them from service in preparation for the winter months prior to the drill. There was no indication of the current sampler status in the EOC. In the future, FRD and the INL will ensure that an up-to-date sampler status is available to EOC staff. Also, there are plans to upgrade the samplers to a model that can operate year-round. (Richard.Eckman@noaa.gov)

On Oct 28, 2015, FRD provided "canned" weather data for an emergency response drill. The data was provided in a set of special files that could be displayed on the standard weather display software used by the emergency response organizations and also used by HYRad. (Roger.Carter@noaa.gov)

A relocation drill was held at the Alternate Emergency Operations Center at CFA on November 19th. The focus of the drill was to familiarize ourselves with the layout of the new alternate site, make sure computers were working, and that documentation and procedures are up-to-date at the new alternate EOC location. (Jason.Rich@noaa.gov)

INL Winter Safety Forum

Kirk Clawson was invited to attend the INL Winter Safety Forum on October 28 at the INTEC facility. The forum is held annually for all INL site facility safety representatives, bus dispatch, and snow removal crew chiefs. Kirk presented information on how the NOAA/INL Weather Center (NIWC) web pages can assist with winter safety at the site. NIWC web pages that were highlighted included: 1) the weather statements and alerts that are issued specifically for the INL, 2) the use of NOAA/INL Mesonet station wind trend graphs for determining outdoor personnel safety and safe operation of wind sensitive equipment, and 3) the simultaneous display of all southeastern Idaho weather and road condition cameras.

INL Road Conditions CRADA with ITD

Kirk Clawson met with representatives from BEA, the Idaho Transportation Department, and the Pocatello National Weather Service to discuss progress being made by BEA on an ITD/BEA Cooperative Research and Development Agreement (CRADA). BEA has assembled three vehicles with road condition monitoring capabilities. The plan is for BEA to drive these vehicles and simultaneously monitor road conditions on interstate I-15, US highways 20 and 26, and state highway 33 between the major cities of Pocatello, Blackfoot, and Idaho Falls and the north and south entrances of the INL site. The trips will be made at around 2 a.m. on days when snow is actively falling or forecast to fall. The data will be uploaded over the internet in real time to a central database that is accessed by ITD and INL bus dispatch for remote monitoring during severe winter storms that have the potential to cause road closures.

INL Hazardous Weather Alert System

Four hazardous weather statements were issued specifically for the INL last quarter. Three of the statements were issued for high winds and the 4th was a Special Weather Statement that was issued for a combination of high winds and blowing snow. (Jason.Rich@noaa.gov)

OTHER ACTIVITIES

Safety

A Safe Cooking video was viewed by FRD staff during October's staff meeting.

On October 15, FRD staff participated in the Great Idaho Shakeout. This is an earthquake drill that is now globally recognized and practiced annually on October 15. We reviewed how to protect ourselves during an earthquake and practiced the three steps of drop, cover, and hold on.

The Safety Team shared safe holiday tips with FRD staff during November's staff meeting.

During December's staff meeting, a video on inattentive driving was viewed by the employees.

Training

Duane Nelson with the Idaho Falls Fire Department provided refresher First Aid/CPR/AED training to FRD employees on December 3rd.

Miscellaneous

In December, Tom Strong bid a fond farewell to his FRD colleagues and officially retired. Tom has been an integral part of FRD for 23 years, working as an Electronic Technician. In addition to his activities maintaining the NOAA/INL Mesonet, he has made significant contributions to many of FRD's research projects, which have taken him to Cape Canaveral, Vandenburg Air Force Base, the Florida Keys, and many places in between. He was a member of the team that deployed Extreme Turbulence probes into landfalling hurricanes. In his spare time, Tom built a two-passenger aircraft that he continues to fly. We wish Tom all the best in retirement.